

corresponds to the broad fascia of the inner middle area, and a fourth small spot just before the knee black; the base of the knee also black inside and below. Hind tibiae pale, with the spines black-tipped. The underside pale olivaceous.

	♂ (type). mm.	♀ (paratype). mm.
Length of body	18	25
„ pronotum	4	5
„ elytra	16	20
„ hind femora ..	10	14

Described from 15 males and 23 females from Entebbe, Banda, Kampala, and Mabira Forest, in Uganda (*C. C. Gowdey*); two females, also from Entebbe (*T. J. Anderson*); one male from Kikandue, British East Africa (*W. L. Sluter*).

A very inconspicuously marked species, belonging to the group with the hind femora unicolorous outwardly. The general coloration and the markings on the inner side of the hind femora are very much the same as in *Catantopsis tæniolatus*, Karsch, but the new insect is, though not larger, more robustly built, with the pronotum more conical, and the male cerci are not bifurcate apically. In some more darkly coloured specimens there is a pale oblique streak on the mesopleuræ.

LXXVIII.—*The Coleoptera of the Madeira Islands*.*

By T. D. A. COCKERELL.

THE Coleoptera of Madeira have been famous ever since Darwin wrote ('Origin of Species,' chap. v.): "Mr. Wollaston has discovered the remarkable fact that 200 beetles, out of the 550 species (but more are now known) inhabiting Madeira, are so far deficient in wings that they cannot fly; and that, of the 29 endemic genera, no less than 23 have all

* I am greatly indebted to Dr. G. A. K. Marshall and Mr. K. G. Blair for the determination of Madeira Islands Coleoptera, and to the latter for assistance in making comparisons with the specimens in the British Museum. I also examined the Madeira collection at Oxford, purchased by Hope from Wollaston and presented in 1861. At Oxford, one Canary I. drawer had got into the Madeira cabinet—a possible source of confusion, as there are no locality-labels.

their species in this condition, . . . the proportion of wingless beetles is larger on the exposed Desertas than in Madeira itself." From these facts he inferred that there had been a survival of the fittest, those forms which were least inclined or able to fly had remained on the islands, while more active individuals had been blown to sea and lost. He also suggested that the effects of disuse might have had something to do with the production of wingless species, but this view is now generally discarded, and the case is quoted by authors as one of the best in support of natural selection.

Although I firmly believe in the potency of natural selection as a directive influence in evolution, I think we must reconsider the case of the Madeira beetles, if only because it is by no means so simple as it first appeared. The facts cited from Wollaston appear striking enough, especially in view of the character of the islands, which are apparently "oceanic," and not remnants of a former extension of the continent of Africa. I have discussed this matter, with special reference to the snails, in 'Nature,' April 8, 1922, p. 446; but it is proper to note that Scharff ('History of the European Fauna,' pp. 19, 25) takes quite a different view. Darwin notes that those Madeira insects which habitually fly are strong-winged (though I should say not exceptionally so), and states that this is not contrary to the view already indicated, for those insects which from their habits were compelled to fly would need to develop powerful wings in order to escape destruction.

At certain times of the year strong hot winds blow from the African deserts in a westerly direction, and no doubt part of the Madeira insect-fauna has reached the islands on the wing, aided by these powerful currents. Lowe (quoted by Darwin) mentions the arrival on the wing of swarms of locusts in 1844. They were in countless numbers, but after a short time disappeared, "and have not since visited the island." However, they doubtless gained a footing, as *Pachytylus danicus*, L. (which I myself took in Funchal), and *Schistocerca peregrina*, Oliv., are at present members of the Madeira fauna—at least the former, and I suppose the latter, a permanent resident. Among the Lepidoptera, *Colias edusa*, *Pyrameis cardui*, *Herse convolvuli*, *Celerio livornica*, *Macroglossa stellatarum*, *Leucania unipuncta*, *Heliothis obsoleta*, *Plusia aurifera*, *P. gamma* (which has also reached the very isolated Salvages), and others may be supposed to have arrived by flight. I cannot see, however, that they have in any respect larger or more powerful wings than represen-

tatives of the same species in Europe or elsewhere. If it were true that all the Madeira insects (excepting those introduced by man) had arrived by flight, we should have to assume that the many flightless beetles had descended from ancestors with unusually strong flying powers, the distance between the Madeiras and the mainland being nearly 400 miles. One has only to contemplate these beetles (*e.g.*, many of the characteristic Tenebrionidæ) to see that this cannot well be the case. In Porto Santo I found the large *Blaps gages*, L. (or *gigas*, supposing *gages* to have been a misprint), said to be the bulkiest of all the Madeira Is. beetles. It has the elytra fused together, and thus was chosen as a typical example to illustrate Darwin's theory, in the exhibit at the British Museum (Natural History), at the time of the Darwin Celebration in 1909. Its distribution on the Madeira and Canary Islands, and even the remote Grand Salvage, is remarkable enough, but the very same species occurs on the mainland, in Europe and Morocco. As a matter of fact, we must doubtless suppose that the ancestors of many of the endemic types of beetles reached the islands on floating trees and similar objects, a few perhaps on the bodies of birds. In this process there would be a strong selective influence; the sedentary or apterous insects would hold on, while more volatile forms would leave their support and perish in the sea. The total absence of Cicindelidæ could thus be explained. These animals are incapable of sustained flight, but also extremely restless. They could neither arrive on the wing nor remain on the most favourable raft. Natural selection might thus account for a preponderance of small and apterous species, in a manner not contemplated by Darwin's theory. Once such sedentary or flightless species had arrived, they would gradually spread, and because of their habits more easily break up into segregates, isolated in different districts or small islands. Thus the Madeira Islands present a long series of perfectly apterous *Helops*, some living only in Madeira, some confined to Porto Santo. In the Desertas, which appear to have been formerly united with Madeira, are three species of *Helops*, all common to Madeira, but not found in Porto Santo. But it is interesting to find that one of these species, *H. vulcanus*, Wollaston, is on the Desertas (Chão and Deserta Grande) slightly wider and larger, with the prothorax distinctly modified. As Wollaston calls this var. α , it must stand as typical *vulcanus* in nomenclature, and his var. δ , from Madeira, may be called var. or

subsp. *maderensis*. In the small Nordeste Island, off Porto Santo, *Helops lucifugus*, Wollaston, has been modified, forming a subspecies which I have described as *maritimus* *.

At this point it is of interest to compare the situation in the Hawaiian Islands, where the number of flightless beetles is also a striking feature. Thus Perkins remarks that of the endemic Carabidæ 184 species are flightless, only 20 fully winged; furthermore, "Nearly all the flightless endemic insects are inhabitants of the forest, or if they frequent exposed situations like some of the Carabidæ, they are closely related to species that frequent thick forests, and are equally flightless" †. Accordingly, Perkins is decidedly of opinion that Darwin's theory of selection, as given above, does not apply to these Hawaiian insects, but he offers the still less acceptable theory of the effects of disuse. If we discard both theories, there remains the selection by sea already suggested. To this may be added the general fact that mutations are more often in the direction of loss or reduction of parts than the reverse. Such mutations, occurring in the wings, would be much less inimical on remote islands than on continents, owing to the smaller number of natural enemies. They would also, by preventing active movement, tend to prevent free intercrossing between members of the species, so that the isolated colonies might exhibit recessive features with diminished danger of swamping by intercrossing. These are very general considerations, and we do not know their actual significance.

In the main island of Madeira, it is difficult to suppose that Coleoptera are in any particular danger of being blown into the sea. Gales are not infrequent, to be sure, but their force is usually felt as they come from the sea, blowing inland. The high precipitous mountains shelter the coasts from winds sweeping across the island. Thus the Bay of Funchal is an admirable shelter for ships when the wind blows from the north, but if (as sometimes happens) it suddenly veers round, they have the greatest difficulty in avoiding disaster. A wreck occurred in this manner while I was in Madeira. This would not apply to the small and barren islands, and it must be said that some of these are wind-swept in such a manner that flying insects might well get lost, unless strong on the wing. Observation shows that beetles abound on these islets, but practically all living

* Trans. Ent. Soc. London, 1921, Proc. pp. lvii-lix, where for *Itheo* read *Ilheo*, for *Nardeste*, *Nordeste*, and for *partosanctunus*, *portosanctanus*.

† 'Fauna Hawaiensis,' Introduction, vol. i. part vi. pl. 1.

under rocks. The absence of numerous groups is obligatory, since the plants on which they should feed are lacking. Darwin's theory may doubtless be accepted at least in partial explanation of the fauna on such islands as Baixo, Cima, Chão, and Nordeste. A singular apparent exception to the general character of these faunas—mainly of Carabidæ, Tenebrionidæ, and weevils—is afforded by the extraordinary Lamiid *Deucalion desertarum*, Wollaston, confined to the Deserta Islands. Wollaston took it on two of the islands (I saw one of his specimens in the Oxford Museum), Lowe on the precipitous summit of Bugio. A related species, *D. oceanicum*, Wollaston, was discovered by Leacock on the Salvages, and is found nowhere else. But even these Lamiids were found under stones and within fissures of rocks.

A striking feature of the Madeira Is. Coleopterous fauna is the absence or small representation of certain families prominent elsewhere. The reasons for these absences may be various; the case of the Ciciindelidæ has already been discussed. To take another example, the Buprestidæ are represented only by the endemic *Agrilus darwini*, Wollaston, and *A. laticornis*, Illig., the latter found since Wollaston's time, and presumably introduced. This is really astonishing, for Morocco has no less than 72 species of Buprestidæ, distributed in 17 genera. Of *Acmaeodera* alone there are 24 species, of *Anthaxia* 10. Probably the meagre flora of native woody plants in the Madeiras may explain why such types as these, even if reaching the islands, could not become established. Thus, the native trees (and near-trees) of the islands apparently consist of only the following genera:—*Catha*, *Cerasus*, *Clethra*, *Dracæna*, *Erica* (2 species), *Ardisia*, *Ilex* (2 species), *Juniperus*, *Laurus*, *Myrica*, *Myrtus*, *Olea*, *Ocotea*, *Apollonias*, *Persea*, *Pittosporum*, *Notelæa*, *Sorbus*, *Rhamnus*, *Salix*, *Sideroxylon*, and *Taxus*. Some of these even may have been introduced in early days; thus Lowe wondered whether the *Sorbus* was really native. Several represent genera not present on the nearest continental areas, so that the chances for any beetle feeding on a particularly woody plant of finding food before it perished would be very remote. Even *Pinus* was apparently absent, though now widely planted and abundant. The same may be said of *Quercus* and *Castanea*.

Albert Fauvel* published the most recent list of Madeira

* Revue d'Ent. 1897, pp. 45 *et seq.* In 'Annaes de Sciencias Naturaes,' 1897-98, Padre Ernesto Schmitz gives a list of the beetles of the Madeira Is., but it is merely a copy of Fauvel's.

Coleoptera. Wollaston had listed 664 species; Fauvel gives 683. The endemic genera, as recognized by Fauvel, with the number of species in each, are as follows. All were described by Wollaston :—

Elliptosoma, 1.
Zargus, 3 and var.
Eurygnathus, 1.
Xenomma, 1.
Stereus, 1.
Microstagetus, 1.
Prostheca, 1.
Xenorchestes, 1.
Mniophilosoma, 1.

Ellipsodes, 1.
Hadrus, 4.
Macrostethus, 1.
Cyphoscelis, 1.
Anemophilus, 3.
Echinosoma, 1.
Stenotis, 1.
Lipommata, 1.
Caulophilus, 1.

Thus 18 endemic genera, as at present recognized. Fauvel added another, which he intended to describe as *Anops*, a genus of Curculionidæ. For some reason, this *Anops* was apparently not described; in any event the name is pre-occupied. It will be observed that most of these endemic genera contain only a single species, and it is quite likely that they are in the majority of instances relicts of an ancient fauna. The one genus of this series which abounds in individuals and obtrudes itself on the collector is *Hadrus*. A related genus (*Exohadrus*, Broun) is found in New Zealand. There is some question whether *Hadrus* is really confined to the Madeiras. *H. europæus*, Motsch., 1858, was said to come from Corsica, and is so listed by H. Gebein (Col. Cat. 1910). R. Lucas also admits a Corsican *Hadrus*. But Fauvel gives this species as a pure synonym of *H. illotus*, Wollaston, which is certainly confined to Porto Santo.

Wollaston thought that about two-thirds of the Madeira species of beetles were endemic; Fauvel was inclined to cut this down to about one-third. However, he was able to list a number of species which almost certainly were not there in Wollaston's day, and, if we subtract all the species probably introduced by man, the original estimate of two-thirds endemics may be below the mark. I believe that students of the Madeira insect-fauna have never fully appreciated the very large percentage of introduced species. The islands have been occupied since the 15th century, and there has been abundant opportunity for many sorts of insects to arrive on plants and merchandise. Probably various members of the original fauna have been exterminated by these newcomers, and it is greatly to be desired that the islands should be searched for small and rare endemic insects, in order to record as many as possible before it is

too late. This applies especially to the orders other than Coleoptera, comparatively neglected by Wollaston. Lists which have been published, such as Noualhier's list of Hemiptera, Becker's Diptera, etc., represent mainly the species collected in or around Funchal, in cultivated areas, and do not do justice to the subject.

A good illustration of the introduction into Madeira of insects from remote regions was given by M. Cameron (Ent. Mo. Mag., Sept. 1901). Collecting for a few days about Funchal, he was surprised to come across *Oxytelus advena*, Sharp, a Staphylinid of striking appearance, described in 1880 from Oahu, Hawaiian Is.*.

An example of an insect which is widespread in Madeira and yet evidently not native is *Sitona latipennis*, Schönherr, which I took on broom (*Cytisus scoparius*) at Funchal, Feb. 25. Wollaston had already recorded that it fed on this plant, which Lowe says was doubtless introduced. But for the food-plant it would have been impossible to decide whether *S. latipennis* was native or not.

Wollaston remarks on the rarity of ant-nest beetles in Madeira. *Geostiba formicarum* (Woll.) is endemic, but, notwithstanding its name, appears not to be a Myrmecophile.

Thorictus westwoodi, Woll., found in Madeira and Porto Santo, is really attached to ants, but according to Fauvel it is not endemic. *Cossyphodes wollastonii*, Westwood, occurs in nests of the introduced *Pheidole megacephala* (Fab.), but it is not endemic.

This condition of affairs can readily be understood in view of the fact that so far as known the islands possess no native ant-fauna whatever. The eleven species known from Madeira (recorded by E. Saunders and Forel) have all been introduced; a twelfth is the Argentine ant, *Iridomyrmex humilis*, Mayr, which in more recent years has overrun both Madeira and Porto Santo. Forel recorded *Monomorium salomonis* (L.) from Porto Santo and the Salvages. I hunted assiduously for endemic ants in Porto Santo, but without success. In an isolated spot near the Pico do Facho I found a small nest

* I take this opportunity to record that I found *Periplaneta americana* (L.) in Funchal (1921). It is not listed in Burr's 'Catalogue of Madeira Orthoptera,' which includes only three Blattidæ. Also, as nothing has been recorded concerning the Orthoptera of Porto Santo, I may note that I collected three species, kindly determined for me by Mr. Caudell. These are *Liogryllus bimaculatus* (De Geer), which also occurs on Grand Salvage Island and in Madeira; *Aiolopus thalassinus* (Fabr.), also observed to be common at Funchal, Madeira; and *Sphinginotus rubescens* (Walker), which I took on the Pico d'Anna Ferreira.

of ants under a stone, but concluded that they were only *Monomorium carbonarium*, Smith, a determination later confirmed by Dr. Wheeler. On Baixo, the largest of the islands off Porto Santo, I could not find any ants at all.

The small islets off Porto Santo have long been famous for their snails, but Wollaston did not report from them any peculiar insects. I collected what I could, and was pleased to find some modified forms. On the small Ilheo de Nordeste occurs a race of *Helops lucifugus*, which I named *maritimus*, but the *Hadrus illotus*, Woll., from the same islet was so slightly modified that no special name was given to it.

On the I. de Cima was a very distinct large race (*cimensis*, Ckll.) of *Scarites abbreviatus*, Dej., but the *S. abbreviatus* on Baixo was like that of the main island. The weevils *Laprocerus morio*, Schön., from Cima and Baixo, and *L. (Atlantis) instabilis* (Woll.), from Cima, did not appear to present any special characters. *Calathus fimbriatus*, Woll., from Baixo (six specimens), are typical. *Harpalus gregarius*, Fauvel, from Cima, are racially different from the typical (Madeira) form, and have been described as subsp. *cimensis*, Ckll., but it is not clear that they can be separated from those on the main island of Porto Santo. Similarly, *Scarites abbreviatus portosanctanus*, Ckll., described from Baxio specimens, is really the Porto Santo form of the species. *Eurygnathus latreillii* (Laporte) was collected by Wollaston on Baixo, but was not different from the Porto Santo type. On Deserta Grande it is somewhat modified, larger and more parallel, opaque; prothorax rather wider, especially in front, with its edges more broadly recurved and its hind angles less distinctly punctured, while the elytral striæ are more perceptibly punctate. This Deserta race, made known by Wollaston, may be named subsp. *wollastoni*.

LXXIX.—On some Psyllidæ (Hem.-Hom.) from the
New World. By F. LAING, M.A., B.Sc.

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Synozza pulchra, sp. n. (Fig. 1.)

General colour very dark shining brown. Antennæ very dark brown to black, with narrow silvery rings at the base of